UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,726	02/13/2004	Seiji Mizuno	10517/214	8234

23838 7590 10/01/2007

KENYON & KENYON LLP
1500 K STREET N.W.
SUITE 700
WASHINGTON, DC 20005

EXAMINER	
DOVE, TRACY MAE	

ART UNIT	PAPER NUMBER
1745	

MAIL DATE	DELIVERY MODE
10/01/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/777,726	MIZUNO, SEIJI	
	Examiner	Art Unit	
	Tracy Dove	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 July 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-23* is/are pending in the application.

4a) Of the above claim(s) *20-23* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/3/07;5/11/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the communication filed on 7/19/07. Applicant's arguments filed 7/11/07 have been considered, but are not persuasive. Claims 15-23 are pending. Claims 20-23 are withdrawn from consideration. This Action is FINAL, as necessitated by amendment.

Information Disclosure Statement

The information disclosure statements (IDS) submitted on 5/3/07 and 5/11/07 have been considered by the examiner.

Election/Restrictions

Newly submitted claims 20-23 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the claims are directed toward a method of manufacturing a separator and the original invention is directed toward a fuel cell.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 20-23 withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claims Analysis

The claims recites "a cross-sectional area of a gas passage being changed in a direction in which the gas passage groove extends, while each of an opening width of the gas passage groove and a depth of the gas passage groove remains substantially constant". The term opening width is interpreted as the width of the groove when the separator is viewed from a top surface of the separator plate (see Figures 6A-6C of present specification).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 15 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Banhardt et al., DE 101 27 322.

Banhardt teaches a separator for use in a fuel cell. The separator has a gas passage groove/channel that is structured in such a way that a larger flow resistance prevails on the fluid inlet side than on the fluid outlet side (abstract). Figures 4 and 5 show the width of the bottom surface of the groove is changed while the opening width and depth of the groove remain substantially constant. Changing the bottom surface of the groove results in different inclination angles of the side surfaces of the groove. Thus the claims are anticipated.

*

Claims 16, 18 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamamoto, JP 10-172586.

Yamamoto teaches a fuel cell having high gas diffusion capability and high performance by arranging a water absorbing member for varying the cross section area of the flow path according to the water absorption amount in a part of a first flow path for supplying fuel gas and/or a second flow path for supplying oxidizing gas. The water absorbing member is applied

to the bottom and/or side surface of the flow path (abstract). The gas flow rate changes within the gas passageway to increase the gas flow and to raise the gaseous diffusion nature to an electrode catalyst (0044). Thus the claims are anticipated.

*

Claims 15 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Debe et al., US 6,780,536.

Debe teaches a flow field plate or bipolar plate used for distribution of reactants to, and removal of products from, opposite sides of a catalyzed membrane in an electrochemical cell such as a fuel cell (4:47-53). Debe teaches it is believed that the partial pressures of fuel and oxidants at the surface of the catalyst at any given point in an electrode of a fuel cell are directly related to the speed of the lateral flux of the gas in the diffuser/current collector (DCC), also known as the separator (5:61-6:9). The flow field channels may have any suitable cross-section, including rectangular and sloped-side cross-sections (6:55-57). The flow field plates may be made of metal (7:35-43). Figure 2 shows the geometry of a single zig-zag flow field wherein the apex half-angle, number and size of loops and the DCC permeabilities can be varied to optimize the tradeoff between pressure drop and uniformity and magnitude of the gas velocities (9:30-38). Debe teaches the angles between successive major segments of the serpentine channel may vary progressively (2:8-10). Figure 2 shows the apex angle θ can be varied (change the inclination of a side surface). Figure 2 shows the width of a bottom surface of the flow channel may vary.

Thus the claims are anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 15 and 17 are rejected under 35 U.S.C. 102(b)/103(a) as being anticipated by, and alternatively unpatentable over, Kosugi et al., JP 2001-043870.

Kosugi teaches a separator for a fuel cell that enhances the performance of the fuel cell by causing a reaction between a fuel gas and an oxidant gas to be efficiently performed over the whole reaction zone of a separator. A fluid passage for passing a fuel gas or an oxidant gas therethrough is provided in one surface 1a of a substrate 1 over the whole reaction zone thereof. The passage is made up of a plurality of parallel and bottomed grooves 4. The cross section of the grooves 4, in the upstream of the fluid passage, is shaped into a trapezoid with the width S1 of an opening part 4a made smaller than the width S2 of a bottom part 4b and, in the downstream of the fluid passages, shaped into an inverted trapezoid with the width of the opening page 4a made larger than the width of the bottom part 4b. The grooves gradually change in cross section from the upstream to the downstream of the passage (abstract). See Figures 2 and 3. The depth of the groove is fixed and the slot can be continuously changed from upstream to downstream or can be gradually changed for every fixed die length in the middle of a fluid channel 2 (0010). The cross section configuration of the upstream side of the groove had a trapezoidal shape and the cross section configuration of the downstream side of the groove had an inverse trapezoidal shape (0008). The cross section configuration of groove 4 may be a circle (curved corners between bottom and side surfaces of the groove) or other configurations (0016).

Thus the claims are anticipated. The claims are alternatively unpatentable. Due to the poor translation of the Kosugi reference it is unclear if S1 and S3 are equal (opening width remains substantially constant). However, Figures 2 and 3 are cross section views of Figure 1. Figure 1 appears to indicate, or at least suggest, that S1 and S3 are substantially equal.

Response to Arguments

Applicant's arguments filed 7/11/07 have been fully considered but they are not persuasive.

Regarding new claim 15

Applicant argues Banhardt does not disclose that the cross-sectional area of the gas passage is changed by changing the radius of curvature of a curved portion. Examiner disagrees. Banhardt teaches a separator for use in a fuel cell. The separator has a gas passage groove/channel that is structured in such a way that a larger flow resistance prevails on the fluid inlet side than on the fluid outlet side (abstract). Figures 4 and 5 show the width of the bottom surface of the groove is changed while the opening width and depth of the groove remain substantially constant. Changing the bottom surface of the groove results in different inclination angles of the side surfaces of the groove.

Applicant argues Debe does not disclose or suggest that the cross sectional area of the gas passage is changed by changing the radius of curvature of a curved portion. Applicant asserts Figure 9 of Debe shows a technique different from the present application. However, Debe teaches it is believed that the partial pressures of fuel and oxidants at the surface of the catalyst at any given point in an electrode of a fuel cell are directly related to the speed of the lateral flux of the gas in the diffuser/current collector (DCC), also known as the separator (5:61-6:9). The flow

field channels may have any suitable cross-section, including rectangular and sloped-side cross-sections (6:55-57). The flow field plates may be made of metal (7:35-43). Figure 2 shows the geometry of a single zig-zag flow field wherein the apex half-angle, number and size of loops and the DCC permeabilities can be varied (cross-section changed) to optimize the tradeoff between pressure drop and uniformity and magnitude of the gas velocities (9:30-38). Debe teaches the angles between successive major segments of the serpentine channel may vary progressively (2:8-10). Figure 2 shows the apex angle θ can be varied (change the inclination of a side surface). Figure 2 shows the width of a bottom surface of the flow channel may vary. Debe is not limited to any particular embodiment shown in the Figures.

Applicant argues Kosugi teaches the opening width varies; however, in the present application the opening width of the gas passage groove remains substantially constant. Due to the poor translation of the Kosugi reference it is unclear if S1 and S3 are equal (opening width remains substantially constant). However, Figures 2 and 3 are cross section views of Figure 1. Figure 1 appears to indicate, or at least suggest, that S1 and S3 are substantially equal.

Regarding new claims 16 and 18

Applicant argues Yamamoto does not disclose or suggest the thickness of the water absorbing polymer sheet. It is unclear how this argument relates to the claimed invention because neither claim 16 nor claim 18 requires a specific thickness limitation. Applicant asserts, in contrast to Yamamoto, the cross sectional area of the gas passage of the present application is changed by changing the surface treatment thickness. However, Yamamoto teaches and suggests this limitation. Yamamoto teaches a fuel cell having high gas diffusion capability and high performance by arranging a water absorbing member for varying the cross section area of the

flow path according to the water absorption amount in a part of a first flow path for supplying fuel gas and/or a second flow path for supplying oxidizing gas. The water absorbing member is applied to the bottom and/or side surface of the flow path (abstract). The gas flow rate changes within the gas passageway to increase the gas flow and to raise the gaseous diffusion nature to an electrode catalyst (0044).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 26, 2007

TRACY DOVE
PRIMARY EXAMINER